

♂. 17 April, 1908. Near World's View, Matopos.

♂. 19 April, 1908. Mt. Silozi, Matopos.

One of the skins from between Lochard Siding and Inyati has a large white patch on the top of the head.

Native name : *Imbila*.

85. *PROCAVIA BRUCEI* Gray.

♂. 24 April, 1908. Kahlele's, Matopos.

Trapped in tree by natives.

Native name : *Imbila*.

86. *ELEPHAS AFRICANUS* Blum.

The Elephant is to be found in Northern Matabeleland, and I saw fresh spoor of a herd on the Kana River in November, 1907.

Native names : *Indhlovu* and *Inkubu*.

87. *MANIS TEMMINCKI* Smuts.

♂. 22 April, 1907. Wankies.

Native name : *Inkaka*.

88. *ORYCTEROPUS AFER* Pall.

♂. Aug., 1907. Mapisa's, near Figtree.

♀. 24 Oct., 1908. Shiloh.

Native names : *Isambane* and *Iwombela*.

3. Report on Deaths which occurred in the Zoological Gardens during 1908. By H. G. PLIMMER, F.L.S., F.Z.S., Pathologist to the Society.

[Received February 1, 1909.]

On January 1, 1908, the number of animals in the Zoological Gardens was 3190 and during the year there were 2418 new arrivals, making a total for the year of 5608. 1737 animals have died during the year, that is roughly 31 per cent., but if from this number we subtract 769 animals which did not live for six months after their arrival in the Gardens—that is, those which had not got used to their new environment—the percentage of deaths is reduced to 17 per cent., which is probably a much fairer number to take.

Of those which have died, 1089 have been examined, and in 41 of these no cause of death could be found. Of the remainder 129 died from injuries of various sorts, or were lost, or not sent for examination, and 30 died from exhaustion due probably to depressed vitality from cold or darkness, or from inability to get or to take food.

The Tables which follow show the facts ascertained in bare outline, and following them are some short notes on the most important points connected with these facts.

Table I. sets forth the causes of death in each of the three great classes of animals. Under Reptiles are included batrachians and fishes.

TABLE I.—Analysis of 993 deaths.

DISEASE.	MAMMALS.	BIRDS.	REPTILES.	
<i>1. Microbic or Parasitic Diseases.</i>				<i>See Notes.</i>
Tuberculosis	59	88	17	1.
Mycosis .....	.....	55	.....	2.
Malaria .....	.....	14	.....	3.
Filaria	3	18	1	4.
Trypanosomiasis	1	2	.....	5.
Hæmogregarines .....	.....	.....	24	6.
Pneumonia	47	29	19	7.
Septicæmia	12	1	.....
Pseudo-tuberculosis	3	.....	.....
Hydatids	1	.....	.....
Worms	3	.....	15	
Itch.....	3	.....	.....
Protozoal infection .....	.....	.....	1	8.
<i>2. Diseases of Lungs.</i>				
Broncho-pneumonia	44	.....	.....
Congestion of lungs	29	100	14	9.
<i>3. Diseases of Heart.</i>				
Pericarditis	7	3	1	
Fatty degeneration .....	.....	3	.....
<i>4. Diseases of Liver.</i>				
Hepatitis	2	.....	.....
Fatty degeneration	1	13	3	
<i>5. Diseases of Alimentary Tract.</i>				
Stomatitis	1	2	.....
Gastritis	4	1	2	
Gastric ulcer	11	1	1	10.
Gastro-enteritis	23	2	27	} 11.
Enteritis.....	57	139	31	
Colitis	15	.....	1	
Acute tympanites	1	.....	.....
Intussusception.....	1	.....	.....
Obstruction .....	.....	1	.....
Peritonitis	15	2	.....
<i>6. Diseases of the Urinary and Reproductive Organs.</i>				
Nephritis	4	1	.....
Inflammation of oviduct .....	.....	2	1	
<i>7. Various.</i>				
Senile changes	1	.....	.....
Anæmia without ascertainable cause	5	2	3	12

Table II. shows the distribution of these diseases amongst the principal classes of Mammals.

TABLE II.—Distribution of diseases amongst the Mammals.

<i>Disease.</i>	<i>Primates.</i>	<i>Carnivora.</i>	<i>Rodentia.</i>	<i>Ungulata.</i>	<i>Edentata.</i>	<i>Marsupialia.</i>
Tuberculosis.....	35	3	14	2	...	5
Filaria	3	...	...	...	...	...
Trypanosomiasis .....	...	...	1	...	...	...
Pneumonia	9	10	14	6	2	6
Septicæmia	2	5	...	4	...	1
Pseudo-tuberculosis .....	...	...	3	...	...	...
Hydatids	1	...	...	...	...	...
Worms	1	2	...	...	...	...
Itch .....	...	...	2	1	...	...
Broncho-pneumonia	17	5	3	10	2	7
Congestion of lungs	13	5	5	3	...	3
Pericarditis	1	3	...	2	...	1
Hepatitis .....	...	1	1	...	...	...
Fatty degeneration of liver .....	...	...	1	...	...	...
Stomatitis	1	...	...	...	...	...
Gastritis .....	...	1	1	1	...	1
Gastric ulcer	3	2	2	...	...	4
Gastro-enteritis	2	8	3	3	...	7
Enteritis	12	11	9	13	2	10
Colitis	8	3	...	2	...	2
Acute tympanites .....	...	...	...	...	...	1
Intussusception .....	...	...	...	...	...	1
Peritonitis	1	1	3	7	...	3
Nephritis	2	2	...	...	...	...
Senile changes .....	...	...	...	1	...	...
Anæmia (cause unknown) .....	...	1	1	...	1	2

Since the lesions of tuberculosis and mycosis are somewhat similar in appearance, care has been taken to separate them accurately, and the following Table sets forth their distribution amongst the different classes of birds.

TABLE III.—Comparative Table of the incidence of Tuberculosis and Mycosis in the various classes of birds.

	<i>Tuberculosis.</i>	<i>Mycosis.</i>
Passeres.....	34	9
Picariæ	2	5
Psittaci	2	11
Anseres ..	4	8
Columbæ	12	3
Gallinæ	29	9
Striges	2	5
Laridæ	1	5
Struthionæ	2	...

The seasonal variations of the principal diseases are very much as might be expected, and there seems to be little of importance to record in this connection. Tubercle remains pretty constant all the year round; mycosis has been more prevalent during the second and fourth quarters; pneumonia and broncho-pneumonia were more prevalent during the first and fourth quarters; and diseases of the alimentary canal have been more marked in the latter half of the year.

There has fortunately been no epidemic amongst the animals during the year, and disinfection has been carried out after every case of infectious disease, so as to lessen, as far as possible, the risks of infection. It will be noticed that there has not been a single case of tumour, cancerous or otherwise, in the animals examined during the year.

Notes on the foregoing Tables.

The following notes refer to a few points of special interest in connection with the diseases mentioned in the Tables.

1. Since the beginning of last year all reptiles have been systematically examined, and tubercle has been found in 17 cases out of a total of 161; and in 5 snakes, tubercular deposits have been found in the lungs. Pulmonary tubercle in reptiles has not, I believe, been described before, and the first specimen found has been preserved in the Museum of the College of Surgeons. Tubercle found in reptiles has so far been all of the avian type, both microscopically and in cultures.

The 88 cases of tubercle in birds seems a large number, but it compares favourably with the number of cases recorded* as occurring in the Berlin Zoological Gardens between December 1903 and August 1905. Between these dates 459 birds were examined there, of which 118 were tuberculous; our figures show that of 479 birds examined only 88 were tuberculous. In two parrots examined the tubercle was of the human type, in all the rest it was distinctly avian.

Of the 35 cases of tubercle in monkeys nearly all were of the human variety, two, however, were of a distinctly bovine type, and in one case the bacilli were of the avian type.

2. In four of the cases of mycosis the disease was due to *Aspergillus niger*, the lesions being similar to those produced by the *Aspergillus fumigatus* which was the organism associated with the remaining 51 cases.

3. Under the general term Malaria I have grouped a series of cases which, so far as I am at present able to state, are caused by parasites belonging to either the group of *Halteridium* or of *Proteosoma*. In these birds the parasites were certainly the cause of death, but they were also found in 12 other birds which died from other causes.

4. Several of the filaria found have not been described before and are still under investigation. In some cases two quite different kinds of filaria have been found in the same host, as in

* Virchow's Archiv, vol. 90.

two Lawes' Birds of Paradise. The difficulty of identification is much increased by the fact that the parent worms often cannot be found. The filaria found in a Bearded Lizard is, I believe, the first found in a reptile.

5. A hitherto undescribed trypanosome has been found in a Francolin which died from mycosis, which is larger than any described so far in birds.

6. Hæmogregarines have been found in 40 reptiles, and in 13 of these, I believe, for the first time. In the cases in which death has been attributed to them the anæmia and blood destruction have been so extreme as to make the diagnosis quite certain; sometimes 50 or even 60 per cent. of the erythrocytes have been affected.

7. Pneumonia in reptiles is of two kinds—one a specific inflammation of the lung, the other a traumatic inflammation due to the irritation produced by ascaris eggs and embryos deposited there. In some cases masses like tubercles are formed around the source of irritation. 13 of these cases were of this irritative kind.

8. This protozoal infection occurred in a bull-frog, and the lesions were identical with those described by Danielewsky in 1889 in his account of the only other case on record in an edible frog. The causative organism which was present in the blood and the exudations in this case was a *Hexamitus* (really *Octomitus*).

9. Of the 29 mammals which died from congestion of lungs, 22 were suffering from rickets, 9 very severely.

10. It will be seen that gastric ulceration is more widely distributed amongst mammals than is usually thought to be the case.

11. The large number of cases of enteritis has led to an investigation into the probable causes. There appear to be three different kinds of enteritis in the Gardens—one which is caused by bacteria, one which is caused by protozoal organisms, and a third variety probably due to errors in feeding. An effort is being made to separate the various kinds, so that at any rate those due to feeding may be got rid of. The very large percentage of cases of gastro-enteritis in the reptiles will be noticed; in 58 out of 161 cases death was due directly to this condition, and in the remainder, which died of other diseases, the same condition was present in varying degrees. It would seem worth while to consider whether the present unnatural and unphysiological method of feeding the snakes has any connection with the very large incidence of inflammations of the alimentary tract occurring in them.

12. In these 10 cases there was very profound anæmia, with considerable blood changes. I think that these cases were in all probability parasitic in origin, but no cause, parasitic or other, could be found.

Several probably undescribed intestinal worms have been found during the year, and are still undergoing investigation.

The work condensed in this paper has been carried out in the laboratories at the Gardens and at the Lister Institute.

February 16th, 1909.

FREDERICK GILLET, Esq., Vice-President,
in the Chair.

The Secretary read the following report on the additions made to the Society's Menagerie during the month of January, 1909:—

The number of registered additions to the Society's Menagerie during the month of January was 79. Of these 54 were acquired by presentation, 20 by purchase, 2 were received on deposit, and 3 were born in the Gardens,

The number of departures during the same period, by death and removals, was 158.

Amongst the additions special attention may be directed to:—

One Desert Fox (*Vulpes leucopus*) and two Gmelin's Sheep (*Ovis orientalis*) ♂ ♀, the latter new to the Collection, from Persia, presented by Capt. T. H. Keyes, F.Z.S., on Jan. 5th.

One Markhoor (*Capra falconeri*) ♂, from N.W. India, presented by Lt.-Col. S. H. Godfrey, C.I.E., on Jan. 18th.

One Red-cheeked Scimitar Babbler (*Pomatorhinus erythrogeus*) and two Occipital Blue Pies (*Urocissa occipitalis*), from India, purchased on Jan. 21st.

One Javan Drongo (*Crypsirhina varians*), from Java; one Dumont's Grackle (*Mino dumonti*), from the Aru Islands; two Black-throated Lorikeets (*Trichoglossus nigrigularis*), two Green-naped Lorikeets (*Trichoglossus cyanogrammus*), and three Green-winged Parakeets (*Aprosmictus chloropterus*), from New Guinea—the Drongo, the Black-throated Lorikeets, and the Green-winged Parakeets being new to the Collection,—purchased on Jan. 18th.

Four Black-cheeked Love-birds (*Agapornis nigrigenis*), from N.W. Rhodesia, new to the Collection, purchased on Jan. 15th and 16th.

Mr. C. Tate Regan, M.A., F.Z.S., exhibited sketches illustrating changes in coloration of some Fishes in the New York Aquarium, and made the following remarks:—

“In September 1907, I paid several visits to the New York Aquarium; the director, Mr. C. H. Townsend, very kindly spent a good deal of time in showing me the fishes and calling my attention to many interesting details. I was particularly struck by the colour-changes in some of the tropical Sea-Perches from the Bermudas, and I made some notes on the coloration of four species, viz. :—

“1. *Epinephelus striatus*.—I devoted some hours in all to the study of this species. The normal coloration, if such a term can be used, may be described thus: ground-colour greyish-olive with irregular paler spots; body crossed by about five broad dark brownish bars; a black spot on the upper part of the bar which

encircles the caudal peduncle. This description would probably apply to some, and usually to most of the specimens observed at any given time, but they were constantly changing, and I came to the conclusion that there must be several different systems which could work independently, either in harmony with or in opposition to each other. These systems were (1) the ground-colour except (2) the pale spots; (3) the upper and (4) the lower halves of the cross-bars and (5) the caudal spot. If these systems worked in harmony the fish would be uniformly coloured, varying from almost white through various shades of greyish-olive and brownish to black. Working independently, the cross-bars might become defined and become even quite black while the ground-colour, remained nearly white, or if the ground-colour became darker the pale spots might or might not appear. The caudal spot was often fading out and suddenly reappearing. Certain changes could only take place in a definite order; the lower halves of the cross-bars never appeared before or persisted later than the upper halves; the caudal spot was never paler than the bar on which it was placed, although it could entirely disappear if the bar had faded out; similarly the bars were never paler than the ground-colour, and although the pale spots could become quite black with the rest of the ground-colour, they could not darken independently of it. All the changes mentioned above could take place either slowly or very rapidly.

"2. *Bodianus punctatus*.—So recently as 1902 Prof. Evermann* distinguished between *B. fulvus*, with the ground-colour lemon-yellow, *B. ruber*, with the ground-colour bright scarlet, and *B. punctatus*, with the ground-colour brownish or blackish-olive. He wrote that these had usually been regarded as subspecies, but that until the fact of intergradation was established, it was best to treat them as distinct species. Individual specimens in the New York Aquarium are continually changing from one so-called species into another. In this species three distinct colour areas, viz. the upper, middle, and lower parts of the fish, separated by straight longitudinal lines, may be recognised. I observed a uniformly yellow fish suddenly assume an orange tint on the back; this gradually deepened into a brownish-red whilst the sides and lower parts became paler. A dark greenish fish changed suddenly into a red fish, and a uniformly red fish became pale on the sides, the upper and lower parts remaining unchanged. A fish with the back chocolate-coloured became darker above and paler below, so that the nearly black back was sharply defined from the almost white sides and lower parts.

"3. *Mycteroperca bowersi*.—A beautiful fish of a brilliant red or crimson, with black edges to the fins. I was only able to watch this species for a few minutes, but saw one red fish become pale pink and another dark olive-green; another in the tank was brownish, and in one the black edges of the fins had disappeared.

* Bull. U.S. Fish. Comm. xx. pt. 1, pp. 149-150.

"4. *Hæmulon flavolineatum*.—Ground-colour changing from pale yellow to deep bronze, with numerous undulating stripes of a blue of varying intensity. Two blackish longitudinal stripes, the lower ending in a spot at the base of the caudal fin, suddenly appeared and disappeared. Similarly, a few irregular broad blackish cross-bars could be turned on and off."

Mr. E. G. B. Meade-Waldo, F.Z.S., read extracts from a letter he had received from Dr. Einar Lönnberg, C.M.Z.S., on the hunting of the Sea-Elephant on South Georgia, and called attention to the necessity of steps being taken to prevent its extermination.

The following papers were read :—

1. The Fauna of the Cocos-Keeling Atoll, collected by F. Wood Jones. By F. WOOD JONES, B.Sc., F.Z.S., with the assistance of other Authors.

[Received December 3, 1908.]

(Text-figures 7-9.)

The fauna of the Cocos-Keeling group has been several times investigated, but it has never been thoroughly worked out. The species enumerated in the following lists were collected during a stay of fifteen months in 1905 and 1906, and the collection, of most orders, may fairly be considered as complete.

Darwin visited the group in 1836 and stayed for only ten days, from April the 2nd to the 12th. Wallace in his 'Island Life' quotes Darwin's list of the fauna (p. 275).

Dr. H. O. Forbes visited the islands in 1879, arriving on January 18th, and staying till February 9th, and he amplified considerably the list made by Darwin; unfortunately his collections were lost in returning to Java, and so the additional species that he observed have not been specifically recorded ('A Naturalist's Wanderings in the Eastern Archipelago,' 1885).

On the 20th of August 1885, Mr. W. E. Birch, on behalf of the Straits Government, landed and made inquiries about the islands and their inhabitants; with him, as naturalist, went the Rev. E. C. Spicer. The expedition visited most of the islets, and remained for eight days in the atoll, but in the report (Straits Blue Book 1885) no light is thrown on the condition of the fauna.

In succeeding Blue Books are scattered notes, made by the Commissioners, on some of the most striking features of the atoll fauna, but most of this information is mere interpretation of local legend, and is of no value.

Dr. H. B. Guppy came to the islands in 1888, and has written